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ABSTRACT

This paper presents a model for qualitative and quantitative evaluation research that has been used in a preliminary way in evaluating a teacher education program. The model is based on three underlying constructs which are hierarchical in nature: (1) the assumption that the question of interest always must dictate the structure of the research design; (2) accessibility of data; and (3) that data are operationally defined as qualitative or quantitative according to their use. Graduates of teacher education programs in 1980 through 1983 responded to two open-ended questions regarding the most important topic to be added to the teacher education program and the most important topic to be deleted from the program. Quantitative and qualitative analyses revealed: (1) where first-year teachers felt ill-equipped; (2) where the teachers reported themselves to be well prepared and satisfied; (3) how these findings relate to new standards on teacher certification; (4) implications for what college students and new teachers expect teaching to be like; and (5) methodological implications for using qualitative and quantitative methods to enhance a study. (CB)

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QUALITATIVE-QUANTITATIVE INTERACTIVE CONTINUUM:
A MODEL AND APPLICATION TO TEACHER EDUCATION EVALUATION

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Qualitative-Quantitative Interactive Continuum:
A Model and Application to Teacher Education Evaluation

Carolyn R. Benz
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When one is asked, "What is the difference between qualitative and quantitative research methods?" the most knowledgeable response is "I don't know." In truth, that question is pragmatically unanswerable because it's the wrong question. Although there are differences in philosophical underpinnings, there is no clear methodological dichotomy. In this paper, several arguments will be offered to support the proposition: QUALITATIVE AND QUANTITATIVE RESEARCH ASSUMPTIONS AND METHODS CAN NEITHER BE COMBINED NOR ARE THEY DICHOTOMOUS, BUT RATHER THEY REPRESENT AN INTERACTIVE NETWORK THAT TENDS TO BE SITUATION-SPECIFIC. This paper presents a model for qualitative and quantitative evaluation research that has been used in a preliminary way in evaluating a teacher education program.

At the outset, it is important to acknowledge that some readers (and maybe even ourselves after we've studied this conceptualization over a more lengthy period of time) may reject the fundamental assertion of this model. And that is, whether evaluation can ever be quantitative at all! Evaluation itself implies judgments as to the worth or value of things, and, on the face of it, is inherently qualitative. Although it is outside the scope of this particular paper, in a previous paper the authors reviewed and philosophical underpinnings of the "dichotomy"* and pointed out that the "idealist"

*It is our view that there is no methodological DICHOTOMY, but rather that qualitative and quantitative methods should constitute options on an interactive continuum. However, so many others have dichotomized the issue, that using this term is in some instances helpful in, at least, acknowledging others' views.

philosophy, foundational to the qualitative approach, is based on the fact that reality cannot be value-free. This is, in fact, what evaluation is--assessing value.

However (at the risk of violating our own operational definitions of evaluation from an epistemological point of view), because of the pragmatic value in exploring what many see as two sets of METHODS of conducting research and evaluation, we continue to utilize the model as illustrative of our point of view.

Desires to maximize the power of qualitative analysis to evoke deep, rich, detailed descriptions of "meaning" come head on against the quantitative advantage in producing firm, hard and generalizable results. This conflict is not new but attempts to forego the latter in favor of the former are more and more popular in appealing to our intuitive common-sense frame of mind. There is almost a chic and trendy attraction to this new wave of qualitative procedures which promise to reveal "all" to those waiting in the wings after funding hundred or thousands of dollars into a program. This move away from quantitative rigidity is also in part a response to the feeling that quantitative analysis has failed. There might also be an element of hope that qualitative analyses can be less stringent at the summative point of evaluation, where "fuzziness" of results offer reduced probability of funding cut-off.

Whatever the reasons, recent increases in acceptability of qualitative evaluation design along with a reduced stress on quantitative models has led some to try a combination of the two or a denigration of one in favor of the other. Koppelman (1997) refers to the dichotomy between the "rationalists" and the "idealists":

Evaluation models reflect this dichotomy. The rational design of the Tyler model is admirable, and yet it is difficult to disregard the criticism of the model based on its failure to deal with important aspects of education such as the unintended outcomes of an educational

activity. A more subjective approach to evaluation, an ethnography, for example, is impressive for its capacity to incorporate unintended outcomes and other subtle aspects of the educational environment, but this approach also has its weaknesses. . . . The problem here should not be misunderstood as the need to determine which perspective is correct, but to accept the validity of both and to create evaluation models that attempt to satisfy the basic demands and overcome the obvious weaknesses of both. (p. 350)

This paper and the model it presents may be one appropriate response to Koppelman's call in the last sentences here. Furthermore, in the context of teacher education, Shulman, in the introductory chapter to the third edition (1986) of AERA's Handbook of Research on Teaching urges support for the creativity embodied in research which ventures beyond the rigid confines of typical quantitative and qualitative camps. But he voices warnings as well.

I will therefore argue that a healthy current trend is the emergence of more complex research designs . . . that include concern for a wide range of determinants influencing teaching practice. . . . These "hybrid" designs which mix experiment with ethnography, multiple regression with multiple case studies, process-product designs with analyses of student mediation, surveys with personal diaries, are exciting new developments in the study of teaching. But they present serious dangers as well. They can become utter chaos if not informed by an understanding of the types of knowledge produced by these different approaches. (p. 4)

The authors here began this monograph pointing to this very concept; that is, that searching for knowledge is the purpose of research and in a response to Shulman, when one begins always with the research question as the dictator of the method, the danger he warns against is almost totally eliminated.

Application of research findings to educational settings is the highest calling of both evaluation research methodologists and practitioners desiring the improvement of teaching and learning. Conclusions drawn from educational research are credible, and, thus, applicable only to the extent that the research design maximizes the underlying assumptions of the scientific method (internal and external validity, e.g.). Credibility is academically, perhaps, only useful, but politically and pragmatically necessary (Newman & Deitchman,

1983). When one bases research design on the question of interest as its primary determinant, then one cannot maintain a purist position. The authors stress that to be enamored of one research method above all others is not only pragmatically counterproductive, but flies in the face of the philosophy of science. To this end, a methodological continuum including both qualitative and quantitative strategies was developed. This model and the use described herein can potentially maximize the value of evaluation in teacher education programs.

Educational settings have been studied through comprehensive and global research techniques which come from the disciplines of anthropology and sociology. It is the position of the authors that these ethnographic strategies (including, among others, case study, field research, participant and nonparticipant observations, and grounded theory methods) have the advantage of enabling investigators at the early stages of research to become familiar with the topic of interest, to be able to conceptualize relationships, and to derive specific hypotheses that are to be subsequently tested through statistical data analysis. This lead, then, to the conceptual continuum of qualitative and quantitative methods, combining both inductive and deductive processes of scientific philosophy, considering both subjective meanings as well as objective measures, and including both theory development and verification (Rist, 1977).

The model proposed here is based on three underlying constructs which are hierarchical in nature:

1. the assumption that the question of interest always must dictate the structure of the research design, the primary assumption;
2. accessibility of the data; and

3. that data is operationally defined as qualitative quantitative according to its use.

Each of these underlying assumptions will be discussed next.

Research Question Always Determines Methodology

First of all, the most fundamental assertion is that the research question always dictates the research methodology. And, in this context, the metaphor for methodology is a network. While by definition a network's most critical component is not its core but its connections, the basis (or "invisible core") for the existence of the network at all is the RESEARCH QUESTION. The question precedes the set up of the design, the population and sample, and the targeted data to be collected. It precedes even the notion of whether the research will be qualitative or quantitative. Most of the recent and ongoing dialogue in the literature (LeCompte & Goetz, 1982; Miles & Huberman, 1984; Smith & Heshusius, 1985) comparing and contrasting the two methodologies would be needless banter if this single assumption were understood and acknowledged. It is important to carefully describe what is meant by the research question in this context and also its relationship to research methods. Smith (1983) has stated that only those who operate from a "rationalist" (subject-object dualism) perspective can separate the PROCESS of research from WHAT IS BEING RESEARCHED; and, concomitantly, that "idealists" (no subject-object dualism) assume that the process of research itself will affect what is being researched. He seems to be implying here that starting with the research question is only applicable to the former philosophy (i.e., quite likely the quantitative researchers and not for those of the latter philosophy (more likely, the qualitative researchers.) We would disagree, however, and maintain that the question of interest ALWAYS is primary, regardless of one's philosophical beliefs. This is not to deny the philosophical/

methodological interaction that Smith espouses. It is, rather, to recognize that the interaction he describes is operationalized subsequent to the question to interest, which remains primary. Simply stated, without a question there is no need to contemplate method. For example, were one interested in interpreting the in-depth meanings to the clients of a treatment program in terms of the descriptive perceptions of its clients one might embark on a qualitative base of assumptions and perhaps methods such as unstructured interviews without hypotheses. Interpreting the dialogue with clients in all its rich detail may answer the research question quite satisfactorily. Perhaps, in a second situation, one is faced with a question of the impact of treatment on an N of eight clients in which variables affected cannot be predetermined; and, thus, exploratory study without hypotheses and with basis in qualitative assumptions and methods would offer the most promise. In a third situation, the question of interest might be whether or not a specific reading curriculum resulted in significant achievement gains on an outcome measure among 30 second graders compared to a traditional program. In this case, a set of quantitative assumptions and method might be selected where hypotheses are stated, an experimental design created, and statistical tests of significance are conducted. When the "rationalists (those philosophically inclined toward the quantitative) fail to assume a "mind-dependent reality" stance and a hermeneutical base of assumptions when the research question requires it may make them epistemologically pure, but does not reflect well on their competence in research methodology. Similarly, when "idealists" fail to assume an objective "mind-independent reality" when the research questions demands it and fail to establish quantitative methods when required to answer the research question at particular point in time, they also fail as researchers.

To conclude, this initial proposition can be stated most helpfully in this way; IF ONE LETS THE RESEARCH QUESTION DICTATE THE METHODOLOGY, THEN ONE IS ALMOST ALWAYS LIKELY TO FIND METHODS AND ASSUMPTIONS ARE CONGRUENT.

Accessibility of Data: A Second Determinant

Regarding the second assumption; i.e., accessibility of the data is a determinant of the research method; examples depict this concern. One example has been given in the preceding section. In essence, the second example in which the variable affected by treatment could not be predetermined serves as an instance where accessibility is a limiter to method options. A further example might exist in the case where the data which are most appropriate to answer the research question are inaccessible. Perhaps legal issues, privacy concerns, or heightened sensitivity regarding the data make it difficult or impossible to access. In these cases, then it might be least ineffective to collect what might be considered "indirect data" or secondary data--interpretations of that data from those who do have access. This determinant is subordinate to the primary determinant, which is the research question.

Research Design is Independent of Analytic Procedures and Data Are Defined as Qualitative or Quantitative

According to Its Use

The third assumption is subordinate to the second in that, at this point, data are assumed. For some researchers it may seem difficult to understand doing qualitative research within an experimental design (Patton, 1980) while others suggest its use (Neimeyer & Resnikoff, 1982). It is our position that whether one can or cannot depends upon where one is within the analysis. For instance, as one collects more and more descriptive information while investigating data related to a research question, one may determine that an experimental design is necessary to test a hypothesis that has "emerged" from a

hunch based on this interpretive, context-embedded, subjective data. In essence, the research question has shifted and has become (or evolved into) a testable hypothesis. The researcher, at that point, can move into a quantitative mode and assumptions and methods shift.

Having described three fundamental underlying assumptions of the model of research methodology, next the model itself is presented.

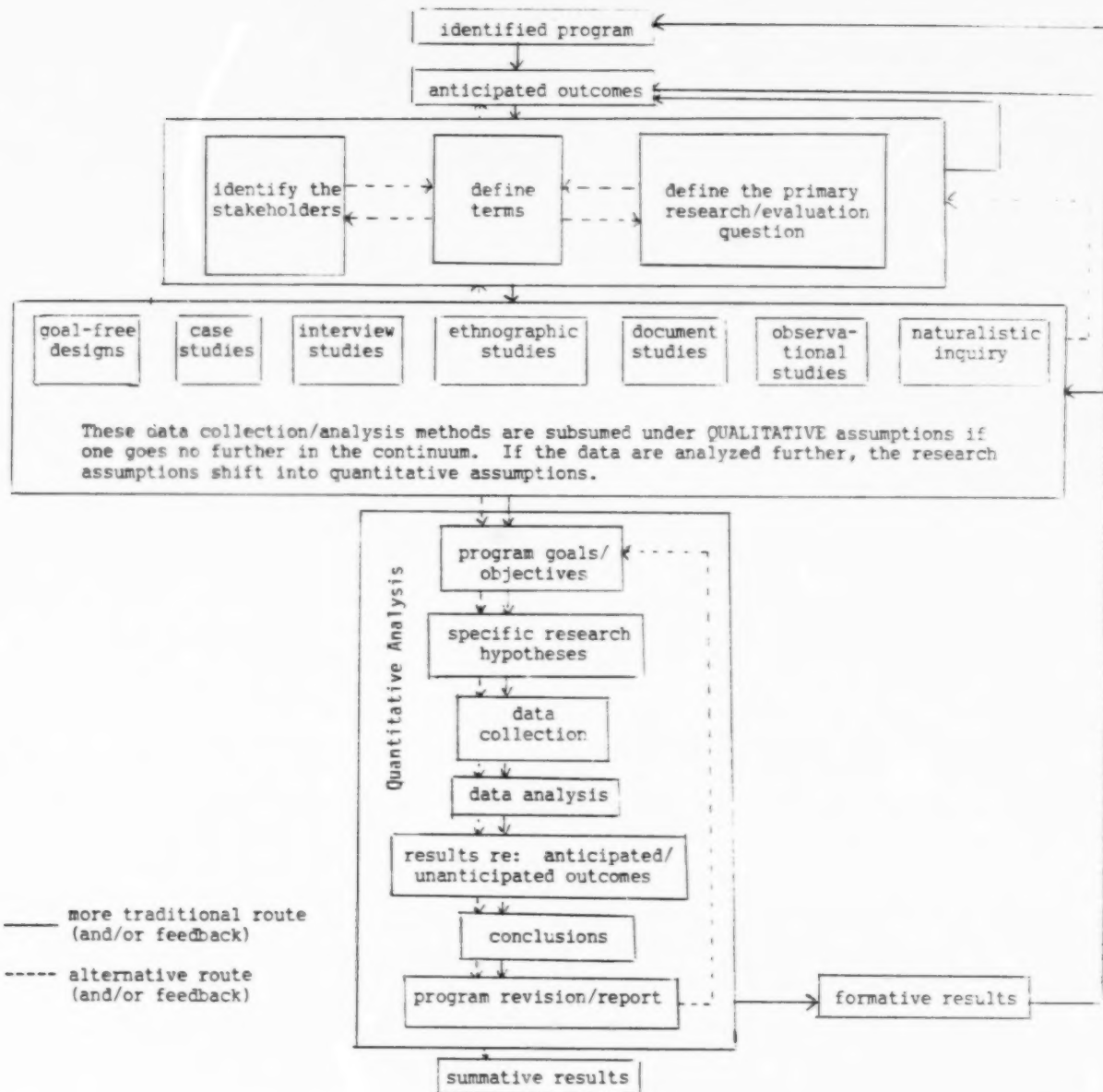
Schematic Presentation of the Model

The modern-day scientific method is both an inductive and deductive process with feedback loops that affect the inductive and deductive procedures which are self-correcting. This philosophy of science conceptualization is the basis of the interactive continuum, presented on page 13. The basis of this evaluation model is a continuum including qualitative and quantitative research methods (Newman & Benz, 1985). Some differences between research and evaluation, however, cannot be ignored, particularly when one expands methods to those inherently qualitative as well as quantitative.

There is probably no easily represented schematic approach that can explain the conceptualization of the Qualitative-Quantitative Interaction Continuum. The following schematic is an attempt to explain the model conceptually and to summarize the interrelationships between qualitative and quantitative methodologies and the scientific approach. It is important that the reader understand that this is a simplification of a concept that has many combinations.

All evaluation stems from the identified program and its anticipated outcomes. The outcomes or goals of the program are the primary sources of the evaluation research design. These can vary, of course, from being "process" outcomes or "product" outcomes, highly structured or relatively loose. These are represented in the top box.

QUALITATIVE-QUANTITATIVE INTERACTIVE CONTINUUM
FOR PROGRAM EVALUATION: THE MANDATA MODEL*



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*"predisposition to expressing wholeness, centeredness, comprehensiveness" (Sanskrit)

Generally, once we go from program to anticipated outcomes, the next endeavor in both qualitative and quantitative evaluation is to identify the stakeholders, define the terms, and define the primary research question that guides the evaluation (the third box). One should keep in mind that, as shown on the model, there are self-correcting feedback loops between these three elements. The stakeholders' interests affect the research question, the terminology, etc. Also, these elements affect the establishment of anticipated outcomes as well. For example, the guiding question will possibly vary depending on the targeted stakeholders in the program.

Fundamental to the philosophical viewpoint of qualitative researchers is the goal of generating hypotheses rather than testing them. Certain qualitative researchers believe, for example, that one should not enter the field of study with preconceived notions, i.e., that the data should be free from the bias of the investigators' expectations and theories.

Two examples from the literature demonstrate this view. Erickson (1973), for example, states:

One school of ethnography advocates that researchers enter their fields with an assumption of ignorance or naivete about the phenomena under investigation; other researchers simply attempt to suspend preconceived notions and even existing knowledge of the field under study. (cited in LeCompte & Goetz, 1982, p. 44)

L. M. Smith (1967) justifies this practice of assuming "ignorance" (to use Erickson's terms) when entering the field of study through the practice of "foreshadowing." This is described in terms of the "foreshadowed problem"--the questions that keep the researcher on the track of the most cogent data. Smith describes this as the question that "selectively guides one's perception and thought while one is in the field." Exactly how this notion differs from the working hypothesis or mere researcher bias is not explained.

It is the bias of the authors of this paper than one always has pre-expectations and it is important for the evaluation researchers to be aware that they have them. It is only through their awareness is there a way of controlling for that bias in the data collection. In program evaluation, in particular, the anticipated outcomes profoundly affect data collection attitudes. Unlike research in which grounded theorists, for example, purposefully might want to deny expectations and preclude a priori coding schemes in order to allow hypotheses to emerge from the data, this degree of detachment is impossible in program evaluation, by definition.

The next section on the model contains frequently mentioned qualitative strategies from the current literature. It is difficult to represent these strategies accurately as discrete entities because one approach may use another approach within its framework as well as within its data collection procedures. Therefore, the reader must have flexibility in understanding this diagram because this is an attempt to represent conceptually the qualitative strategies within the scientific method approach.

While looking at this diagram there is a dotted line that seems to go through the "qualitative strategies" box into the "data based analysis" box. The reason for the dotted line is that in quantitative research it "appears" that one goes from specifying outcomes directly to developing hypotheses and collecting data. In reality, the stakeholders, the question of interest, and the terminology frequently require qualitative analysis and conceptualizations to help formulate the hypotheses to be tested. In a traditional quantitative analysis this is sometimes called "derivation of hypotheses," a qualitative analysis in simplified form. The solid line going from the box containing

"the stakeholders" and the "research/evaluation question" to "qualitative strategies" box and its feedback loops are what some individuals will identify as qualitative analysis IN ITS ENTIRETY.

One hastens to interject that this qualitative-quantitative interactive evaluation model allows for the process of "goal-free" evaluation. Scriven (1983) characterizes such evaluation as analogous to the doubled-blind design in medical research. It is somewhat consistent with the qualitative wing which analyzes data by exploration and with no hypotheses up front. He further differentiates between goal-based and goal-free evaluations by asserting that the former reflects "a managerial" bias and the latter reflects "consumer" bias--these characterizations indicative of the value of both kinds. When one, however maintains a narrow "either-or" methodological bias, either qualitative or quantitative, this attitude precludes such potential benefit.

As one can see, the qualitative analysis with its feedback loops can easily modify the types of research questions that will be asked in quantitative analysis research and that the quantitative analysis results and its feedback can change what will be asked qualitatively. Therefore, this model is not only a continuum from qualitative to quantitative, but interactive. One generally identifies qualitative and quantitative research according to the type of question being asked and the type of data being collected. If the data cannot be quantified or is not quantified, then the research is qualitative; and if one wishes to terminate the discourse in the scientific process within the qualitative analysis box of this schematic, then the evaluation research is qualitative. If one utilizes the strategies in the quantitative analysis sequence, the evaluation research is quantitative. Most critical to stress here is that THE RESEARCH QUESTION ALWAYS DICTATES THE METHOD.

The fifth "box", the next level after the qualitative strategies, contains the quantitative methods. This seems to be implying a sequence of qualitative-to-quantitative. This might often be true. However, although difficult to depict, what is important to stress is this: The feedback loops provide for self-correcting the EVERY level. In other words, the qualitative strategies might reveal findings that feed back into the previous level and affect the evaluation question and identify new stakeholders, etc.

To continue, the quantitative analysis begins with the program goals/objectives. From these, specific research hypotheses are derived, data are collected and analyzed, and results are revealed from quantitative tests. Additionally, there may be unintended results as well. Conclusions are drawn from which a report is draw up. The feedback loop at this point from the final report, if directed back into the program constitutes a formative type of evaluation report: if such feedback is precluded, the evaluation would be considered a summative one. Notice that this summative evaluation is outside the model--outside the option of internal feedback loops. This intends to show that while the model is based almost entirely on the concept of constant feedback potential, when one intervenes to preclude such feedback, this is by definition, a summative evaluation. In the model here however, feedback is provided at every step including the final report EVEN IF summative results are invoked after that report.

The conceptualization of this model was an attempt to maximize the value of evaluation by exploiting the strengths of both qualitative and quantitative research/evaluation methods. Following is an example of implementing this model in a teacher education program. The evaluation example comes from systematic follow-up study of teacher education graduates (Benz & Newman, 1985).

Population

Graduates were sent the survey instrument one year post graduation. This mailed questionnaire was sent in April or May of the year following receipt of the degree. Graduates from 1980 were contacted in 1981, for example. Data from graduates of the classes of 1980, 1981, 1982, and 1983 were aggregated for this study, a total N of 233.

<u>Class</u>	(N)	<u>% Responses/Year</u>
1980	66	53.0%
1981	61	50.0%
1982	41	56.9%
1983	<u>65</u>	67.3%
Total	233	

This population was 78% female (N = 182) and 22% male. The age range was from 22 years to 49 years old, a median age of 24, and 77% were under age 30. Almost 98% were Caucasian (N = 228) and 2% Black (N = 5). Most students had completed the bachelor's degree as their highest degree (83%, N = 193) and 40 (17%) had completed a master's degree. The overall mean (x) grade point average of this group was 3.31 (on a 4.00 system); 28% had GPAs lower than 3.00; and 25% had GPAs above 3.60. The predominant college major of these subjects was Elementary Education (N = 101, or 43%); 20 (8.5%) were in Special Education; 68 (29%) in various areas of Secondary Education; and 10 (4.3%) in Physical Education; the remainder (N = 33) had no major listed. Thirty-four of the total indicated a dual major and that they held dual certificates.

Qualitative Findings

Initially, responses to two open-ended questions were transcribed and listed verbatim for the groups graduating in 1981, 1982, and 1983. The 1980 group was not administered these two questions. These two questions were:

In your opinion, what would be the most important thing(s) that could be added to the College of Education program that was not offered when you were here?

In your opinion, what would be the most important thing(s) that should be deleted or changed in the College of Education undergraduate program?

A processual analysis through coding was conducted on these data.

Twenty-two pages of transcription (not included here) were prepared for these three groups of graduates. Themes from these responses were integrated and coded and further inspected by arranging them by year according to frequency (Appendix A). Then the most frequent responses for each year were extracted and interpreted to speculate as to whether or not there were similarities between groups.

This focussed coding (Appendix B) revealed that "discipline and classroom management" was the most frequent theme for all groups in response to what is needed in the preservice program. Secondly was the factor of "computer education." Following were the themes of both "working with parents" and "working with children."

In terms of what should be deleted/changed in the opinions of these graduates the themes emerging through focussed coding were to "change the course on testing" and "change other foundations courses--introduction to education and the senior seminar on current educational problems."

These findings were compared and contrasted to responses to other open-ended questions, addressing whether or not the job of the first year met the students' expectations and optional comments and added comments on the survey. These results are beyond the realm of this paper but provided added depth of description to the total evaluation of the program that is described in college technical reports.

Quantitative Analysis - Results

The effectiveness of the preparation students received on the 17 competencies was measured by compiling their responses on a rating scale of the quality of that preparation from a value of 1, "very poor," to a value of 6, "excellent." The mean ($\bar{x}$) and median responses were calculated and ranked from the most effective preparation to the least effective preparation, and these are reported on Table 1. By comparing these ratings it is possible to tentatively conclude on which factors graduates feel effectively prepared and on which factors they feel less effectively prepared. These perceptions can provide valuable information for the college as they carry out ongoing evaluation of their curriculum. Additionally, the college may be faced with evaluative judgments--necessary where results indicate comparative significantly less effective preparation on some competencies than others. These judgments must weigh both the competency, its validity (whether legally mandated or not), its relative importance in undergraduate course outlines, and its relationship to other items' rated effectiveness.

The first finding considers the relative effectiveness of all 17 competencies. "Writing and using lesson plans" was rated ($\bar{x}$) 4.46 on a scale of 1 to 6, the highest rating; second was "knowledge of subject matter," a mean ($\bar{x}$) rating of 4.24. The third rank ordered rating through the eleventh were all in the 3.3 to 3.8 $\bar{x}$ range. The lowest three ratings of effectiveness were on "writing legibly on the chalkboard," "working with parents," and "knowledge/skills in computer-based instruction"--the lowest effectiveness rating for all competencies, with an $\bar{x}$ of 2.39.

Multiple t-tests were conducted to determine in which competencies graduates rated themselves significantly ($\alpha = .05$) more well prepared or significantly less well prepared compared to other competencies. Based on the

TABLE 1

Perceived Effectiveness (Rank Ordered from Highest
to Lowest Quality) of Teacher Education Program:
Responses of Baccalaureate Degree Recipients
One Year Post Graduation

	<u>Median</u>	<u>$\bar{x}$</u>	<u>SD</u>	<u>(N)</u>
1. writing and using lesson plans	5.00	4.46	1.20	(225)
2. knowledge of subject matter (e.g., elementary teaching, secondary social studies, business education, etc.)	4.00	4.24	0.95	(223)
3. teaching reading	4.00	3.86	1.40	(188)
4. developing tests and/or evaluative measures	4.00	3.83	1.12	(224)
5. using diagnostic instruments (giving tests, reading, math, etc.) in professional and appropriate ways and interpreting the results	4.00	3.74	1.05	(224)
6. use of audio-visual aids and other media in productive ways	4.00	3.71	1.26	(225)
7. understanding pupils' emotional and physical development	4.00	3.69	1.09	(224)
establishing rapport with pupils	4.00	3.69	1.22	(224)
8. aware of the goals of "mainstreaming" and relating well to "exceptional" handicapped and gifted pupils	4.00	3.59	1.20	(218)
9. differentiating assignments according to skills, interests, etc.	4.00	3.56	1.08	(224)
10. grouping for instruction	3.00	3.40	1.03	(219)
11. working in an organization, relating to peers, superiors, etc., in productive interpersonal human relationships	3.00	3.31	1.29	(223)
12. classroom management (dealing with discipline, disruptive, abusive, withdrawing behavior, e.g.)	3.00	3.18	1.26	(224)
13. understanding the changing nature of pupils' families (single parent homes, two working parents, etc.)	3.00	3.06	1.28	(220)
14. writing legibly on the chalkboard	3.00	2.96	1.47	(216)
15. working with parents	3.00	2.72	1.22	(217)
16. knowledge and skills in computer-based instruction	2.00	2.39	1.24	(220)

NOTE: Preparation rating scale:

1	2	3	4	5	6
very poor	poor	fair	good	very good	excellent

qualitative analysis it was hypothesized that the competencies of "classroom management and discipline," "working with parents," and "computer education" would show significantly lower effectiveness ratings on preparation than other competencies.

Table 2 reports the findings in terms of t-values. One can scan the grid and quickly see interrelationships of preparation ratings on the competencies. This shows instances where the rating of effectiveness of each competence was significantly different from each other competence or was not significantly different from each other competence. The t-value and p value are shown where statistical significance resulted. An X is shown where there was no statistically significant difference on effectiveness. Thus, one can see that while preparation in "classroom management" was rated less effective than 11 other competencies, "use of audio-visual instruction" resulted in little difference in preparation rating and the differences that did appear were mixed. Other relationships can be gleaned from this table.

On Table 3 appears a grid that is more explanatory. In sum, the data showed that graduate rated themselves less effectively prepared in "computer education" than in all other competencies and similarly for "working with parents," they rated lower in effectiveness than in 14 other areas. "Classroom management and discipline" was somewhat less negative in comparison, although it was still rated less effective than 11 other competencies. Also, on this grid one can tell which areas were rated comparatively more effective in preparation (column 2) as well as see where the competencies did not receive significantly different ratings (column 3).

Table 2

Results from Multiple t-Tests on
Effectiveness Ratings
 (t values and p values)

2nd Variable

First Variable	Subj.	Mgmt.	Tchg. Rdg.	Dev. Tests	Rapport	Lesson Plans	Main-stream	Emot/ Phys.	Using Diag.	Grouping	Diff. Assign.	Use Audio-Visual	Comp. based Instr.	Wrtg. Chalk-board	Work Organization	Parents	Chng. Family
Subject		11.70 .000	3.09 .002	4.55 .000	6.43 .000	~~X~~	6.94 .000	6.86 .000	5.30 .000	9.71 .000	7.40 .000	5.39 .000	19.65 .000	10.98 .000	10.63 .000	16.42 .000	13.19 .000
Management			-5.37 .000	-6.59 .000	-5.49 .000	-12.18 .000	-4.26 .000	-5.68 .000	-5.91 .000	~~X~~	-4.03 .000	-4.73 .000	7.70 .000	~~X~~	~~X~~	4.31 .000	~~X~~
Teaching Reading				~~X~~	~~X~~	-4.08 .000	~~X~~	~~X~~	~~X~~	4.28 .000	~~X~~	~~X~~	12.32 .000	5.58 .000	4.07 .000	8.84 .000	6.27 .000
Dev. Tests				~~X~~	~~X~~	-6.78 .000	~~X~~	~~X~~	~~X~~	5.22 .000	~~X~~	~~X~~	14.41 .000	6.93 .000	4.78 .000	11.21 .000	7.49 .000
Rapport					~~X~~	-7.75 .000	~~X~~	~~X~~	~~X~~	3.33 .001	~~X~~	~~X~~	12.65 .000	6.17 .000	4.31 .000	10.65 .000	6.79 .000
Lesson Plans							8.20 .000	8.22 .000	8.04 .000	12.04 .000	10.95 .000	7.63 .000	18.39 .000	13.26 .000	11.56 .000	16.58 .000	14.30 .000
Mainstream								~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	11.15 .000	4.58 .000	~~X~~	8.52 .000	5.41 .000
Emotional/Physical								~~X~~	~~X~~	3.84 .000	~~X~~	~~X~~	12.56 .000	6.48 .000	4.64 .000	11.46 .000	7.90 .000
Using Diag.									~~X~~	4.47 .000	~~X~~	~~X~~	12.87 .000	6.67 .000	4.36 .000	10.62 .000	7.04 .000
Grouping											~~X~~	-3.15 .001	10.02 .000	3.87 .000		8.08 .000	3.54 .000
Diff. Assign.											~~X~~	~~X~~	11.35 .000	5.68 .000	3.03 .003	9.75 .000	6.04 .000
Use Audio-Visual												~~X~~	14.27 .000	6.41 .000	4.06 .000	9.45 .000	6.82 .000
Computer-based Instruction														-4.81 .000	-8.73 .000	-3.32 .001	-6.33 .000
Writing on Chalkboard															-3.13 .002	~~X~~	~~X~~
Work Organization																7.84 .000	3.21 .002
Parents																	-4.41 .000
Changing Family																	

Note: $\alpha = .003$ corrected for multiple comparisons.

Table 3

Multiple Comparisons on Seventeen Teaching Competencies

This competency . . .	. . . is rated less effectively prepared (p .003) than:	. . . is rated more effectively prepared (p .003) than:	. . . is not different on effectiveness (p .003) from:
1. Knowledge/skills in computer-based instruction	all other (16) items	no other items	
2. Working with parents	all other (14) items	*knowledge/skills in computer-based instruction	*writing legibly on the chalkboard
3. Writing legibly on the chalkboard	*all other (13) items	*knowledge/skills in computer-based instruction	*working with parents *understanding the changing nature of pupils' families (single parents, two working parents, etc.)
4. Understanding the changing nature of pupils' families (single parents, two working parents, etc.)	*all other (12) items	*knowledge/skills in computer-based instruction	*classroom management (dealing with discipline, abusive, withdrawing behavior, e.g.) *writing legibly on the chalkboard
5. Classroom management (dealing with discipline, disruptive abusive, withdrawing behaviors, e.g.)	all other (11) items	*knowledge/skills in computer-based	*grouping for instruction *writing legibly on the chalkboard *working in an organization relating to peers, superiors, etc., in productive inter-personal human relationships *understanding changing nature of pupils' families (single parents, two working parents, etc.)

This competency . . .	. . . is rated less effectively prepared (p .003) than:	. . . is rated more effectively prepared (p .003) than:	. . . is not different on effectiveness (p .003) from:
6. Grouping for instruction	all other (7) items *using diagnostic instruments (giving tests, reading, math, etc.) in professional and appropriate ways and interpreting the results *understanding pupils' emotional and physical development *writing lesson plans *establishing rapport with pupils *developing tests and evaluative measures *teaching reading *knowledge of subject matter (e.g., elementary teaching, secondary social studies, business education, etc.)	*knowledge/skills in computer-based instruction *writing legibly on the chalk-board *working with parents *understanding changing nature of pupils' families (single parents, two working parents, etc.)	
7. Knowledge of subject matter (e.g. elementary teaching, secondary social studies, business education, etc.)	none	*all other (15) items	*writing and using lesson plans
8. Writing and using lesson plans	none	all other (15) items	*knowledge of subject matter (e.g., elementary teaching, secondary social studies, business education, etc.)

A third quantitative analysis was conducted to determine whether being hired as a teacher was significantly related to perceived preparation. The fact that those graduates teaching and not teaching had widely disparate attitudes about their preparation in 17 competencies was not indicated by discriminant analysis, direct-entry, techniques. When 17 "quality of preparation" variables were entered into the equation, there was no significant difference between graduates employed as teachers and those not employed as teachers ($R^2 = .12$, $df = 17/153$, $F = 1.27$, $p > .05$). However, when ratings of "importance" of these same competencies to the current job were tested against a criterion variable of teaching/non-teaching, significant discrimination was revealed ($R^2 = .16$, $df = 17/163$, $p < .05$).^{*} Further analysis employed stepwise regression methods to determine which of the "importance" rating on the 17 competencies maximize the differentiating power between those teaching and those nonteaching. The first variable entered was "working with parents" ($R^2 = .07$, $df = 1/179$, $F = 13.81$, $p = .0003$), the second was "classroom management/discipline" ($R^2 = .09$, $df = 2/178$, $F = 9.67$, $p = .0001$), and the third and final variable was "understanding pupils' changing family life, single parents, etc." ($R^2 = .12$, $df = 3/177$, $F = 8.96$, $p = .00009$).

Conclusions and Discussion

Several conclusions can be made from these results. They have to do with: (1) where first-year teachers feel ill-equipped, (2) where they report themselves to be well-prepared and satisfied, (3) how these findings relate to new Ohio standards on teacher certification, (4) implications for what college

^{*}"Importance ratings" are similar to the "effectiveness Ratings" but graduates were asked "how important" the competency was to you on the job." These data (x, SD, N) appear in Appendix C.

students and new teachers expect teaching to be like, and (5) methodological implications for using qualitative and quantitative methods to enhance a study.

First of all, computer-based education is obviously a competency in which first-year teachers feel ill-equipped. Similarly, "working with parents," "writing on the chalkboard," "understanding the changing family," and "classroom management" are all areas needing attention, according to this report. On "subject matter knowledge" and "writing lesson plans," first-year teachers feel well prepared compared to other areas. These findings are consistent with some proposed alterations in state requirements (effective January 1987) for teacher education in the following areas.

A proposed change in standards requires the professional education program curriculum to include "communicating and working with parents." This is not part of current standards in Ohio and the proposed change seems to be a move toward meeting needs of first-year teachers. No proposed state-level change has been made to address needs in the area of computer education. The results here would indicate that that might be a recommended change, and, if not at the state level, at least at the local training institutions. However, as computer education is progressively implemented in K-12 programs over time, more and more entering freshmen will demonstrate these skills, reducing, then, this burden on higher education. The current mandates require the curriculum to address dealing with behavior problems. The proposed standards maintain this requirement but the language has been slightly altered to read, "applying planning and management skills in instruction and to discipline and behavioral concerns." Colleges of teacher education need to continue to improve the type of preparation in classroom management that is effective, and, in a sense, the

proposed standard is more explicit in stressing the "means" by which this should be done; i.e., have preservice teachers learn planning and develop skills in management, and, one could add, decision-making.

Finally, the qualitative analysis revealed results beyond those tested in statistical ways. These first-year teachers implied that those courses usually characterized as foundations (coursework in testing, current problems in education, and, less frequently, educational psychology) were less valuable than those in methods and their content areas. They further implied that in addition to requesting that those courses be "changed or deleted," more time with children, in actual teaching situations, is what was needed. Typical to attitudes of teachers is that the ONLY way to learn to teach is by teaching.

This attitude, i.e., that one only learns to teach by teaching, reflects what many experienced teachers also believe. Students typically prioritize field experience and student teaching as more valuable than coursework in preparing them for the teaching role. It seems to be, however, that these courses are exactly those whose content promises to ameliorate the new teachers' problems--namely, classroom management and, to a certain degree, evaluation. These findings suggest two things. First of all, they indicate that perhaps we are not doing an effective job of showing preservice teachers the connections between foundational material in education and the myriad day-to-day, real-life decisions teachers makes. They need to be taught how and why testing methods are relevant to their professional role. These courses may, furthermore, emerge as negative merely because they're more difficult. If this is the case, then this may imply a more careful screening in admissions; i.e., to attract and retain those students capable of, first of all, adequate performance in more difficult courses, and, secondly, those who do make the transfer from professional courses dealing with teaching and

learning principles, testing, historical and psychological foundations, and the day-to-day decision making of teaching. If links are not being made between behavioral, social, and cognitive theory and the actual teaching/learning situation, then the addition of more and more field experience (what students see as real teaching) will do nothing to improve the profession.

Finally, this study is, in conclusion, an example of combining and sequencing qualitative and quantitative research strategies that allow researchers to (1) verify a priori hypotheses, and, (2) discover new, unforeseen relationships. It seems to offer as well ways to conduct evaluation in which methods can be consistent with presuppositions. This will, in turn, benefit teacher education program evaluation so that it will be most helpful to improving programs. Such dilemmas as have occurred in the "effective schools" research can be, at least, minimized, and at best, eliminated.

This reference is to the recent criticisms of the body of educational research in which results from qualitatively founded studies have been generalized and implemented in ways only appropriate to quantitative assumptions. The early effective schools studies in the 70s consisted of case studies within those inner-city elementary schools which seemed to have broken the connection between poverty and low achievement. Field studies within these statistical outliers resulted in several principles or characteristics that were seemingly related to effectiveness. Less than ten years later, these "findings" have been globally generalized through two federally funded research centers (one elementary and one secondary) based on these "findings." Twenty states now sponsor school improvement projects based on these "findings"; 1,750 school districts and 75,000 schools are currently being served by projects based on school effectiveness research.

Just recently in Education Week, (January, 1986) have there been calls for a closer look at "effectiveness" findings. Matthew Miles, Senior Research Associate at Center for Policy Research in New York City, claims that few effective schools projects evaluate themselves well; Stewart Purkey (Education Week, 1986), calls grand implementation premature because of "thin" findings; Jan Shoemaker, head of evaluation of one of the larger school effectiveness projects, the Connecticut project, is now calling for evaluation of such programs; William Gauthier cautions against generalizing beyond the appropriate scope. He points out the early studies were limited to basic skills in inner city elementary schools and that it is unwarranted to take those findings and generalize to suburban schools at the secondary level. Gauthier also serves the state of Connecticut schools as well as being the head of AERA's special interest group on effective schools.

These criticisms verify the need to relook at educational evaluation in ways that scrutinize the frequent inconsistencies between assumptions and methods. The effective schools research was begun based on a qualitative philosophy and the results were generalized as though they were quantitatively determined. The acceptance and utilization of The Qualitative-Quantitative Interaction Continuum for Program Evaluation is a step in the right direction to bringing educational evaluation to higher levels of professionalism, i.e., to being pragmatically useful as well as foundationally sound. Rather than lending confusion to the dialogue between the qualifiers and the quantifiers, this model help clarify the issue.

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APPENDIX A
INITIAL CODING OF
OPEN-ENDED RESPONSES

Themes of Responses to Question
Requesting Additions
1981 Graduates

Watch self on videotape (2)
 Career counseling (7)
 Computer education (5)
 "Hands-on materials" (2)
 Role playing (administrator, parents, etc.) (2)
 Discipline (17)
 Middle school (2)
 Teacher organizations (2)
 Business education methods (2)
 Summer internships - technical education (2)
 Substituting (2)
 Reality of day-to-day (3)
 More on-the-job (3)
 More/better supervision (2)
 Technical education student teaching (2)
 Parents (2)
 More field experience in art (2)
 More on testing and scoring (2)
 Lesson planning (3)
 More clinical/lab (2)
 More with children (6)
 Time management (2)
 More time in student teaching (3)
 More field experience earlier (freshman) (2)
 Split student teaching at two grade levels (2)
 Curriculum development (2)
 More individualization (2)
 Counseling course in technical education (2)
 More interracial tension (2)
 More on drug and alcohol (2)
 More special education (2)
 More reading (2)
 More on teaching adults (2)
 Better placement system (2)
 Letter grade for student teaching (2)
 School law course (2)
 Better counseling and advising (2)

Themes of Responses to Question
Requesting Additions
1982 Graduates

Options for those employed other than full-time student teaching (2)
 Field experience specific to major (2)
 Communication skills with severe handicapped (2)
 Computer education (10)
 Parents (5)
 Discipline (11)
 Dealing with colleagues (2)
 Oral communication (2)
 Senior Seminar needs changed (2)
 Course for writing on chalkboard (2)
 How to use grading system (2)
 More on model classrooms (2)
 More field experience earlier (6)
 Some special education courses required of all (5)
 More real-life experiences (6)
 More hands-on (2)
 Teaching reading at secondary level (2)
 Remedial reading course (2)
 Less busy work (3)
 Two levels of student teaching (2)
 More open classrooms (2)
 Dealing with teenagers (2)
 Field experience in various schools (2)
 More individualized instruction (2)
 More on testing (2)
 Counseling and advising (3)
 School law (2)

Themes of Responses to Question
Requesting Additions
1983 Graduates

Parents (8)
 Management (1)
 Accounting/bookkeeping (1)
 Classroom management (20)
 Senior Seminar (1)
 More advising (1)
 Matching objective with instruction and testing (1)
 More computer (16)
 More mainstreaming (6)
 More classroom with children (5)
 Conferences (2)
 Questioning (1)
 Using centers (1)
 Gradebook (1)
 Write lesson plans (1)
 Getting materials (1)
 Career alternatives (2)
 Master's degree with teacher certification (1)
 Job searching skills (2)
 Testing and measurement (2)
 Curriculum development (1)
 Substitute teaching information (1)
 Relevance to today's schools (3)
 Elective course opportunity (2)
 Guarantee/warranty of job with degree (1)
 More supervision (1)
 Reading course split by grade level (1)
 Multicultural (1)
 Media production (2)
 Increase repertoire of teaching strategies (1)
 Psychological disturbance of children (4)
 Competency based education (1)
 A teacher competency test (1)
 More in science education (1)
 More reading (1)
 More enthusiastic/interested professors (1)
 More gifted (1)
 Dealing with peers (3)
 More student teaching (1)
 Report cards (1)

Themes of Responses to Question
Requesting Deletions/Changes
1981 Graduates

Drop the Two-Year College course (3)
 Get programs tailored to technical education (2)
 Drop student teaching seminar (3)
 Harder grading (2)
 Drop algebra requirement (2)
 Change course on testing (10)
 Drop Senior Seminar on current education problems (3)
 Drop nothing (5)
 Simplify requirements during student teaching seminar (3)
 Change Senior Seminar to deal with classroom situation (2)
 College professors had to be required to go out to school and teach (4)
 Secondary students need more with 7-12 graders (1)
 Get more on discipline (2)
 Delete course on education history course (3)
 Educational Psychology course separated into one for elementary and one for secondary (2)
 More on computers (2)
 Less general college courses, more teaching courses (5)
 More methods classes in real schools (2)
 "Design," "Handicrafts" nonsense courses (1)
 Delete Biology requirement (1)
 Drop computer testing (2)
 Social Studies methods course - drop (2)
 Drop field experience prior student teaching (2)
 Better supervision (4)
 Drop emphasis on games (4)
 Grade for student teaching (2)

Themes of Responses to Question
Requesting Deletions/Changes
1982 Graduates

All methods courses should be one full semester (2)
Technical Education, delete some college of education courses (2)
Testing courses unneeded (5)
Principles class unneeded (2)
Delete some literature (2)
Don't have first field experience be as a tutor (20)
Delete Two-Year College programs (1)
Senior Seminar, delete or change (6)
Introductory education class, delete or change (2)
Delete Biology requirement (1)
Change professional semester; simplify (5)
Test to get degree (2)
Delete busy work (2)
Delete educational history class (2)
Delete labs (2)
Educational Psychology class, delete (2)

Themes of Responses to Question
Requesting Deletions/Changes
1983 Graduates

Change introductory education course (4)
 Change testing course (8)
 Add computer course (2)
 Eliminate art and music if had it in F&AA (1)
 Get professors in classrooms (1)
 Re-evaluate criteria for student teaching sites (2)
 Less cut and paste (too much money) (5)
 Eliminate seminar (2)
 Eliminate microteaching (1)
 Faculty teaching needs change (1)
 Vocational education - waive teaching courses if have experience (1)
 Delete Introductory course in secondary education (1)
 Change early secondary field experience to three weeks in three separate sites (1)
 Add to Language Arts, more coursework (1)
 Add field experience (3)
 Better communication with university-site (1)
 Fewer term papers (1)
 Internships (one year) instead of student teaching (1)
 Improve field experience (2)
 Interaction between elementary-secondary (1)
 Better lab use (not so much cut and paste) (1)
 Better methods classes (not so much cut and paste) (1)
 Art, physical education and music classes - add actual children (1)
 Cut down courses on "physical development," increase emotional/social development" (1)
 Change Language Arts ("too general") (1)
 More student teaching supervision (2)
 Delete diagnostic reading class (1)
 Get rid of idealism - "get real" (1)
 More in secondary subject area, less education (2)
 More in reading (2)
 "Review" social studies program (1)
 Eliminate design course for non-art people (20)
 Eliminate Mickey Mouse courses (1)
 Less in art (1)
 Shorten Content Reading (2)
 "Behavior" classes bad (1)
 "Reevaluate" courses (1)
 Design and music should be one year (1)
 More in classroom management (1)
 Delete so much on lesson plans (1)
 More practical, less theory (2)
 All okay - no deletions (1)

APPENDIX B
FOCUSED CODING OF
OPEN-ENDED RESPONSES

Needs to Be Added to Curriculum:
Most Frequent Themes

1981

Discipline (17)
Career counseling (7)
More time with children (6)
Computer education (5)

1982

Discipline (11)
Computer education (10)
Real life experiences (6)
Earlier field experiences (6)
Working with parents (5)
Special education courses (5)

1983

Classroom management (20)
Computer education (16)
Working with parents (8)
Special education courses (6)
Time with children (5)

Needs to be Deleted from the Curriculum:
Most Frequent Themes

<u>1981</u>	<u>1981</u>	<u>1983</u>
Change coursework on testing (10)	Change senior seminar on current problems (6)	Change coursework on testing (8)
Change nothing (5)	Change coursework on testing (5)	Less cut and paste--too costly (5)
Less general courses, more "teaching courses (5)		Change introductory course (4)

APPENDIX C
RATINGS ON IMPORTANCE
OF COMPETENCIES

Perceived Importance (Rank Ordered from Highest
Quality to Lowest Quality) of Teacher Education
Program: Responses to Baccalaureate Degree
Recipients One Year Post-Graduation

<u>Item</u>	<u>Median</u>	<u>x</u>	<u>SD</u>	<u>(N)</u>
1. teaching reading	5.00	4.80	1.11	(210)
2. knowledge of subject matter (e.g., elementary teaching, secondary social studies, business education, etc.)	5.00	5.18	1.11	(210)
3. using diagnostic instruments (giving tests, reading, math, etc.) in professional and appropriate ways and interpreting the results	5.00	4.22	1.74	(201)
4. use of audio-visual aids and other media in productive ways	5.00	4.01	1.33	(215)
5. classroom management (dealing with discipline, disruptive, abusive, withdrawing behavior, e.g.)	5.00	5.08	1.05	(211)
6. understanding pupils' emotional and physical development	4.00	4.25	1.29	(212)
7. writing legibly on the chalkboard	4.00	3.92	1.37	(206)
8. developing tests and/or evaluative measures	5.00	4.63	1.18	(210)
9. differentiating assignments according to skills, interests, etc.	4.00	4.04	1.35	(210)
10. working in an organization, relating to peers, superiors, etc., in productive interpersonal human relationships	4.00	3.90	1.32	(202)
11. grouping for instruction	4.00	4.15	1.22	(211)
12. knowledge and skills in computer-based instruction	4.00	3.94	1.19	(213)
13. understanding the changing nature of pupils' families (single parent homes, two working parents, etc.)	3.00	3.08	1.67	(207)
14. working with parents	4.00	3.55	1.41	(208)
15. establishing rapport with pupils	5.00	4.53	1.10	(211)
16. aware of the goals of "mainstreaming" and relating well to "exceptional" handicapped and gifted pupils	5.00	4.50	1.36	(205)
17. writing and using lesson plans	5.00	4.51	1.27	(208)

NOTE: Importance rating scale:

1	2	3	4	5	6
lowest	low	fairly	mod.	high	highest
importance	imp.	imp.	imp.	imp.	importance
on the job					on the job